## REMARKS

The Examiner has requested that Claims 1 - 21, which are withdrawn under a restriction requirement without traverse, be cancelled. Applicants have requested that these claims be cancelled without prejudice.

Applicants' attorney would like to thank the Examiner for the telephone interview granted on August 24, 2004. This interview was very helpful in formulation of the subject matter of this Amendment "C" which is being submitted with a Request for Continued Examination of the subject application, in response to the Advisory Action mailed September 14, 2004.

Claim Rejections Under 35 USC § 103:

Claims 22, 23 and 26 - 32 are rejected under 35 USC § 103(a) as being unpatentable over O'Donnell et al. in view of Singh.

Applicants respectfully contend that Claims 22, 23, and 26 - 32 are not obvious over the combination of the O'Donnell et al. and Singh references. The O'Donnell et al. reference relates to a corrosion-resistant component of semiconductor processing equipment such as a plasma chamber which comprises a zirconia toughened ceramic material as the outermost surface of the component. The component can be made entirely of the ceramic material or the ceramic material can be provided on a substrate such as aluminum or aluminum alloy, stainless steel, or refractory metal. (Abstract) The ceramic material is designed to provide corrosion resistance for the component surface. Corrosion is not the problem applicants' component is designed to solve, and the surface of the component is a sacrificial layer rather than the ceramic itself.

As explained in the present application, applicants want to provide a component comprising a ceramic surface over which a sacrificial layer has been applied, where the sacrificial layer can be easily removed from the ceramic surface at an appropriate time. Simultaneously, when the sacrificial coating comes under tensile stress due to deposition of another material on the surface of the sacrificial coating, the sacrificial coating should not separate from the ceramic surface of the

component. (Application, Page 1, lines 9 - 24, continuing at Page 2, lines 1 - 3; and Page 2, lines 5 - 19.) Applicants' invention, as claimed in amended Claim 22, pertains to a component which includes a ceramic surface having patterned undercut mechanical interlocks thereon, with a sacrificial coating mechanically interlocked over the ceramic surface, which sacrificial coating can be removed essentially without harming the ceramic surface. Typically, the sacrificial coating is removed by a chemical treatment which etches away the sacrificial layer, leaving the ceramic surface with patterned undercut mechanical interlocks in place. This permits reuse of the component, the surface of which is re-coated with the sacrificial layer.

One of the most important embodiments of applicants' invention is a deposition ring which is used during the sputter deposition of metals. The deposition ring is positioned over a portion of an electrostatic chuck where the chuck is exposed when the substrate is on the chuck surface. This deposition ring is typically made of a ceramic material and is designed to prevent sputtered material from depositing on the electrostatic chuck around the edge of the substrate. (Page 1, lines 9 - 24, continuing at Page 2, lines 1 - 3.) Eventually the sputtered material which has accumulated on the deposition ring has to be removed. Applicants discovered that when the sputtered material is tantalum (a metal frequently used in semiconductor manufacture), it is particularly difficult to remove from the ceramic surface. (Page 2, lines 5 - 9.) Application of a chemical wet etchant to remove the tantalum proved unsuccessful. (Page 2, lines 8 - 9.) Use of a sacrificial layer of aluminum between the ceramic surface and the sputter depositing tantalum enabled a "lift off" process where a chemical etch removed both the sacrificial layer of aluminum and the overlying sputtered tantalum. However, frequently prior to cleaning of the ceramic surface for reuse, the aluminum would separate from the ceramic surface and a combination of aluminum and tantalum flaked off. The ceramic surface of the deposition ring had been roughened using grit blasting to provide for better adhesion of the aluminum sacrificial layer, but this clearly was inadequate.

Applicants needed to find a structure where the sacrificial layer could be easily removed when desired, but would remain on the ceramic surface at other times (during substrate processing). A component having the structure claimed in Claim 22 provides the desired results.

The subject matter described in the O'Donnell et al. reference does not suggest the concept which is the basis of applicants' invention, and this reference does not render applicants' invention obvious.

The Singh reference discloses a method of producing an improved adherent interface between a film or coating and a substrate of metal, ceramic, or composite material by laser treatment of the surface. Semi-periodic microscale surface structures of less than 200 microns in magnitude are made by laser radiation of at least 50 pulses, with an energy density of 0.01 to 15 $J/cm^2$ and a duration of 100 femtoseconds to 1 millisecond on each surface area treated. (Abstract) The method does not make use of an exposure mask or an optics system for producing a patterned beam which produces an undercut structure of the kind described and claimed by applicants when laser etching is used on the substrate surface. (Col. 3, lines 16 - 20.) The improved adhesion of a coating to a laser treated substrate created by the Singh method is attributed to the creation of a gradation of thermal stresses across an interface extending from submicrons to 100 microns across the perpendicular dimension of the film. The graded interface is said to achieve grading of the mechanical stresses. The surface interfacial area is said to be greatly increased due to periodic valleys and open structures, and contaminants and other unwanted materials are said to be better removed from the substrate surface by the laser etching process. (Col. 4, lines 7 - 18.) The improved adhesion of the coating is the sole goal of the subject matter described. There is no suggestion in the Singh reference that the coating on the substrate should be easily removed using some techniques, but difficult to remove under other circumstances. There is no suggestion that the coating should be removable without affecting the underlying substrate surface.

A combination of the teachings in the O'Donnell et al. reference with those in the Singh reference will not lead one skilled in the art in the direction of applicants' invention, because neither of these references address the use of a sacrificial coating over a ceramic surface where the sacrificial coating is designed to be easily removed, essentially without harming an underlying ceramic surface under some circumstances, while maintaining good adhesion under other circumstances. This characteristic is very important to reuse of the substrate comprising a ceramic surface, which is required for many of the end use product applications anticipated by applicants.

In view of the above distinctions, the Examiner is respectfully requested to withdraw the rejection of Claims 22, 23, and 26 - 32 under 35 USC § 103(a) as being unpatentable over O'Donnell et al. in view of Singh.

Claims 33, 34, and 37 - 43 are rejected under 35 USC § 103(a) as being unpatentable over O'Donnell et al., in view of Singh, and further in view of Hong et al.

Claim 33 is an independent claim relating to a deposition ring for use within a physical vapor deposition chamber. The requirements for this product application fall under the basic elements of the invention which are recited in Claim 22 with respect to components for use in a semiconductor chamber in general. Claims 34 and 38 - 43 depend from Claim 33. Claim 37 has been cancelled without prejudice.

Applicants contend that their invention is not rendered obvious by a combination of the O'Donnell et al., Singh, and Hong et al. references. Claim 33 is distinguishable over the O'Donnell et al. reference in combination with the Singh reference for the reasons provided above. The Hong et al. reference relates to a plasma reactor for physical vapor deposition (PVD), also known as sputtering, which is adapted so that the atomic species sputtered from the target can self-sustain the plasma without the need of a working gas such as argon. According to the invention, a bias ring arranged around the wafer and rising above it is electrically biased to control the plasma potential, and hence to control the energy and directionality of the ions being sputter deposited on the wafer.

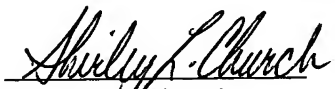
The bias ring can be either a separate biasing element which can be positioned at a selected height above the wafer or a clamping ring clamping the wafer to the pedestal, but having a biasing surface electrically insulated from the wafer and the pedestal. (Abstract) The Examiner has cited the clamp ring in Hong et al. as being formed of an insulating ceramic ring with a metallic film on its top surface. The Examiner cites text which describes the clamping ring as having a metallic body 48 on its side facing the plasma and an insulating film 50 on its side touching the wafer 16 and pedestal 18. The DC power supply is connected to the metallic body 48 through an electrical line 52. Alternatively, the clamping ring may be formed principally of an insulating ceramic with a metallic film on its top surface, and the DC power supply is connected to the metallic film. There is no mention of the use of patterned mechanical interlocking to attach a metal film to a surface of the ceramic substrate of the ring. There is no mention in the Hong et al. reference about the need to remove sputtered material from such a clamping ring. There is no suggestion that removal of sputtered material from the ring might be difficult. There is clearly no suggestion that the metallic film on the ring might be removed from the ring in a manner which does not harm the underlying insulating ceramic portion of the clamping ring. Thus, a combination of the teachings of the Hong et al. reference with those of the O'Donnell et al. reference and the Singh reference would not lead one skilled in the art in the direction of applicants' invention.

In view of the above explanation of the distinctions between the subject matter of applicants' invention and the teachings of the references cited, the Examiner is respectfully requested to withdraw the rejection of Claims 33, 34, and 37 - 43 under 35 USC § 103(a) as being unpatentable over O'Donnell et al., in view of Singh, and further in view of Hong et al.

Applicants submit that entry of the amendments requested herein sufficiently distinguishes the claimed subject matter from the prior art, and that entry of the amendment would place the application in condition for allowance. The Examiner is respectfully requested to enter the present amendment and to pass the application to allowance.

The Examiner is invited to contact applicants' attorney with any questions or suggestions, at the telephone number provided below.

Respectfully Submitted,



Shirley L. Church
Registration No. 31,858
Attorney for Applicants
(650) 473-9700

Correspondence Address:
Patent Counsel
Applied Materials, Inc.
P.O. Box 450 A
Santa Clara, CA 95052